Pre-Laboratory #Binary Multiplier Circuit

ECE 332

1 Introduction

This pre-lab consists of two parts. Part one of this pre-lab is a questionnaire section. You have to write answers for some general questions on multipliers. In part two of pre-lab you are going to multiply two 3-bit numbers. Go through each step carefully because you are going to write VHDL code for multiplying two 3-bit numbers as a part of Lab-Multiplier.

Part 1

2 Short questions on Multiplication on binary numbers

- If you multiply an n-bit number with an m-bit number the result will be of \_\_\_\_\_\_\_\_\_ bits in length.

- Explain the term Partial product.

- List the type of gates (AND, OR etc) you are going to use to realize a partial product.

- List the type of gates (AND, OR etc) and the modules (Half Adder, Full Adder etc) you are going to use to realize a multiplication in binary numbers.
Part 2

3 Example on Multipliers

A and B are two 3-bit binary numbers having the binary values of 111 and 110 respectively. Calculate C such that C = A multiply B or A * B. What is the Length of C i.e how many bits does 'C' consists of? Do the calculation in the space provided. Indicate partial products in your calculation.
3.1 Expressions for Partial Products

Derive the expressions for the Partial Product when you multiply A and B. Where

- A = 3-bit number → represented by $A_2A_1A_0$.
- B = 3-bit number → represented by $B_2B_1B_0$.
- Partial products are represented by $P_1, P_2$ etc.
3.2 Circuit Diagram

Draw the Circuit diagram which implements a 3x3 bit multiplier.